

REMARKS

Claims 1-5 are pending in this application, of which claims 1 and 2 have been amended and claims 4 and 5 are newly-added.

Claim 1 stands rejected under 35 USC §102(b) as anticipated by European Patent Application No. 0 072 997 A2 to Katayose et al. (hereinafter "Katayose et al.").

Applicants respectfully traverse this rejection.

Katayose et al. discloses an engine control apparatus comprising a fuelcut control circuit for terminating delivery of fuel to the engine when the throttle valve opens at an angle less than a predetermined value and the transmission is in high gear or in neutral. The apparatus also comprises means for preventing the fuelcut control circuit from terminating fuel delivery to the engine when the pressure stored in a brake booster increases to a level insufficient for application of braking to the vehicle.

Page 19, line 8 to page 20, line 5 disclose:

To decelerate the vehicle without operating the shift lever, the driver may release the accelerator pedal and depress the brake pedal. If the vehicle is decelerated in this manner when the transmission is in high gear, the throttle position sensor 10 generates the signal A and the gear position sensor 20 generates the signal B, causing the fuelcut control circuit 80 to terminate fuel delivery to the engine. In the course of such vehicle deceleration, depressing the brake pedal several times causes an increase of the pressure in the brake-booster vacuum chamber 602. When the pressure in the brake-booster vacuum chamber 602 increases over the first reference level, the pressure level sensor 60 generates the signal F, causing the fuelcut inhibition circuit 70 to disable the fuelcut control circuit 80 so as to resume fuel delivery to the engine and also the restart control circuit 90 to restart the engine. As a result, the pressure in the brake-booster vacuum

chamber 602 will decrease. When the pressure in the brake-booster vacuum chamber 602 falls below the second reference level, the pressure level sensor 60 terminates the generation of the signal F, causing the fuelcut control circuit 80 to terminate fuel delivery to the engine and also the restart control circuit 90 to stop restarting the engine. (Sic)

Turning to the present invention, page 34, lines 8-17 of the specification disclose:

According to the first aspect of this invention, as described above, the engine-operation enable/disable determining device determines whether or not to operate the engine based on the pressure which is to be supplied to the brake booster and detected by the pressure detector and the throttle opening state detected by the throttle-opening-state detector. When the negative pressure to be supplied to the master cylinder decreases as the driver performs pedal manipulation, such as applying pumping brake, thus making the absolute value of the negative pressure smaller, the negative pressure of the brake booster can be secured by operating the engine. This can prevent a large burden from being put on the driver.

Katayose et al. differs from the present invention in at least the following ways:

1. Katayose et al. is not directed to an engine control system for a hybrid vehicle, to which the present invention is directed, as recited in claim 1.
2. Katayose et al. is directed to preventing a reduction in the durability of a starter which is used in an ordinary internal combustion engine. According to the present invention, on the other hand, "the electric motor" is a motor for driving a vehicle, and therefore, has a higher durability than the above-mentioned starter. Concerning the present invention, the durability of the motor should not be considered a problem.
3. According to Katayose et al., the connection of a clutch (power transmission means) is observed, so that the engine is not permitted to stop again until the clutch is connected. This guarantees a negative pressure and prevents a reduction in the durability of the starter. On the other hand, the present invention determines whether or not to operate the engine based on the throttle opening state and the negative pressure. Concerning the throttle opening state (though it also depends on the way brake manipulation is conducted while the vehicle is running), the reduction of the negative pressure caused by pumping the brake by the driver is recovered and the engine is started in such a manner that brake manipulation is not affected, in order to secure the negative pressure.

4. As explained above, the durability of the motor should not be considered a problem in the present invention and, therefore, the region of the time in which the engine is stopped throughout the whole running time can be increased. In Katayose et al., when the running status is detected by the connection of the clutch and the engine is prohibited from stopping again until it is determined that the negative pressure can be secured, the region of time in which the engine is stopped will be narrow and, accordingly, the degree of contribution made by the engine stop operation to fuel consumption will be decreased. (In fact, when the clutch is set to ON/OFF, the engine will stop, but the durability of the starter may become a problem.)

Furthermore, in a hybrid vehicle, electric power should be guaranteed to only an amount which is able to start an electric motor at the time of starting and, therefore, the battery remaining charge is kept under observation. A hybrid vehicle is different from an internal combustion engine vehicle in this point. When a conventional battery for an internal combustion engine vehicle is used, only the voltage is observed. Accordingly, when the above-mentioned conventional battery is used for a hybrid vehicle, a situation can occur in which the electric motor can no longer be started when a reduction in the voltage is detected. Such a situation can be prevented by a battery for a hybrid vehicle by observing the battery remaining charge, as in the present invention.

Thus, the 35 USC §102(b) rejection should be withdrawn.

Claim 3/1 stands rejected under 35 USC §103(b) as unpatentable over Katayose et al..

Applicants respectfully traverse this rejection.

As noted above, Katayose et al. fails to teach, mention or suggest the limitations recited in claim 1, from which claim 3 depends.

Thus, the 35 USC §103(b) rejection should be withdrawn.

The Examiner has indicated that claims 2 and 3/2 would be allowable if rewritten in independent form.

Accordingly, claim 2 has been so amended.

In view of the aforementioned amendments and accompanying remarks, claims 1-5, as amended, are in condition for allowance, which action, at an early date, is requested.

09/520,164

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned "**VERSION WITH MARKINGS TO SHOW CHANGES MADE**".

If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

In the event that this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees which may be due with respect to this paper, may be charged to Deposit Account No. 01-2340.

Respectfully submitted,

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Enclosures: Version With Markings To Show Changes Made
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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Claims:

Claims 1 and 2 have been amended as follows:

1. (Amended) An engine control system for a hybrid vehicle having an internal combustion engine and an electric motor as driving force sources, for permitting stopping and starting of said engine in accordance with predetermined drive conditions, comprising:

battery remaining charge computing means for computing battery remaining charge of the electric motor;

brake booster for receiving negative pressure supplied by an operation of said engine; pressure detector for detecting a pressure supplied to said brake booster; throttle-opening-state detector for detecting a throttle opening state; and engine-operation enable/disable determining device for determining whether or not to operate said engine when said engine is stopped[,] based on said throttle opening state detected by said throttle-opening-state detector [and], said pressure detected by said pressure detector, and said battery remaining charge computed by said battery remaining charge computing means.

2. (Amended) [The] An engine control system [according to claim 1] for a hybrid vehicle having an internal combustion engine and an electric motor as driving force sources, for permitting stopping and starting of said engine in accordance with predetermined drive

conditions, comprising:

brake booster for receiving negative pressure supplied by an operation of said engine;
pressure detector for detecting a pressure supplied to said brake booster;
throttle-opening-state detector for detecting a throttle opening state; and
engine-operation enable/disable determining device for determining whether or not to
operate said engine when said engine is stopped, based on said throttle opening state detected by
said throttle-opening-state detector and said pressure detected by said pressure detector,

wherein said engine-operation enable/disable determining device:

permits said engine to operate when said throttle opening state is other than completely closed;

causes said engine to stop when said throttle opening state is completely closed and said pressure detected by said pressure detector is equal to or [lower] less than a predetermined negative pressure which is equal to or [lower] less than an atmospheric pressure; and

permits said engine to operate when said throttle opening state is completely closed and said pressure detected by said pressure detector is closer to the atmospheric pressure than the predetermined negative pressure which is equal to or [lower] less than the atmospheric pressure.

Claims 4 and 5 have been added.

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